DOCUMENT RESUME

ED 340 475 PS 020 159

AUTHOR Slavin, Robert E.; And Others
TITLE Preventing Early School Failure: What Works? Report No. 26.
INSTITUTION Center for Research on Effective Schooling for Disadvantaged Students, Baltimore, MD.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Nov 91
CONTRACT R117R90002
NOTE 23p.
PUB TYPE Information Analyses (070) -- Reports - General (140)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Academic Failure; Class Size; *Disadvantaged Youth; *Early Intervention; *Early Reading; Educational Media; Grade 1; Grade Repetition; Kindergarten; Low Income; Preschool Education; *Prevention; Primary Education; *Reading Failure; Teacher Aides; Tutoring
IDENTIFIERS Reading Recovery Projects; Success for All Program; Writing to Read

ABSTRACT

This report summarizes research on the impacts of alternative early intervention programs to prevent school failure. Also considered are the magnitude of estimates of program effects and policy implications of using the programs. The nine principal types of early schooling programs reviewed are those involving: (1) substantial reductions in class size; (2) provision of instructional aides in the early grades; (3) preschool for 4-year-olds; (4) extended-day kindergarten; (5) retention in kindergarten and first grade; (6) provision of transitional first grade, developmental kindergarten, and other extra-year programs for immature or at-risk children; and (7) one-to-one tutoring; and (8) IBM's Writing to Read Program; and (9) Success for All program. The review concludes that among the nine strategies, the most effective by far for preventing early school failure are those that involve one-to-one tutoring in reading for first graders, especially in structured models that use well-trained certified teachers as tutors. Such programs not only have the greatest immediate effects on reading achievement, but they are also the only programs known to have lasting effects, at least through the third grade. Appended are 62 references. (Author/GLR)

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Preventing Early School Failure: What Works?

Robert E. Slavin, Nancy L. Karweit

and

Barbara A. Wasik

Report No. 26

November 1991

CENTER FOR RESEARCH ON EFFECTIVE SCHOOLING FOR DISADVANTAGED STUDENTS

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Published by the Center for Research on Effective Schooling for Disadvantaged Students, supported as a national research and development center by funds from the Office of Educational Research and Improvement, U.S. Department of Education. The opinions expressed in this publication do not necessarily reflect the position or policy of the OERI, and no official endorsement should be inferred.

Center for Research on Effective Schooling for Disadvantaged Students
The Johns Hopkins University
3505 North Charles Street
Baltimore, Maryland 21218

The Center

The mission of the Center for Research on Effective Schooling for Disadvantaged Students (CDS) is to significantly improve the education of disadvantaged students at each level of schooling through new knowledge and practices produced by thorough scientific study and evaluation. The Center conducts its research in four program areas: The Early and Elementary Education Program, The Middle Grades and High Schools Program, the Language Minority Program, and the School, Family, and Community Connections Program.

The Early and Elementary Education Program

This program is working to develop, evaluate, and disseminate instructional programs capable of bringing disadvantaged students to high levels of achievement, particularly in the fundamental areas of reading, writing, and mathematics. The goal is to expand the range of effective alternatives which schools may use under Chapter 1 and other compensatory education funding and to study issues of direct relevance to federal, state, and local policy on education of disadvantaged students.

The Middle Grades and High Schools Program

This program is conducting research syntheses, survey analyses, and field studies in middle and high schools. The three types of projects move from basic research to useful practice. Syntheses compile and analyze existing knowledge about effective education of disadvantaged students. Survey analyses identify and describe current programs, practices, and trends in middle and high schools, and allow studies of their effects. Field studies are conducted in collaboration with school staffs to develop and evaluate effective programs and practices.

The Language Minority Program

This program represents a collaborative effort. The University of California at Santa Barbara is focusing on the education of Mexican-American students in California and Texas; studies of dropout among children of recent immigrants are being conducted in San Diego and Miami by Johns Hopkins, and evaluations of learning strategies in schools serving Navajo Indians are being conducted by the University of Northern Arizona. The goal of the program is to identify, develop, and evaluate effective programs for disadvantaged Hispanic, American Indian, Southeast Asian, and other language minority children.

The School, Family, and Community Connections Program

This program is focusing on the key connections between schools and families and between schools and communities to build better educational programs for disadvantaged children and youth. Initial work is seeking to provide a research base concerning the most effective ways for schools to interact with and assist parents of disadvantaged students and interact with the community to produce effective community involvement.

Abstract

This report summarizes research on the impacts of alternative early intervention programs to prevent school failure, examines the magnitude of estimates of program effects, and discusses policy implications of using the alternative approaches. The nine principal types of early schooling programs reviewed are substantial reductions in class size, provision of instructional aides in the early grades, preschool for four-year-olds, extended-day kindergarten, retention in kindergarten and first grade, provision of transitional first grade or developmental kindergarten, Writing to Read, one-to-one tutoring, and Success for All. The review concludes that among the nine strategies, the most effective by far for preventing early school failure are programs that involve one-to-one tutoring in reading for first graders, especially in structured models that use well-trained certified teachers as tutors.

Introduction

Although most school restructuring proposals are still at the rhetorical or pilot stage, actual reform is proceeding at a remarkable rate in the area of early schooling. Most policy makers and educators now agree that effective interventions in preschool, kindergarten, and/or first grade will pay off in later achievement, reduced need for remedial and special education, and other outcomes.

More remarkably, legislatures, school districts, and other funding agencies are actually devoting substantial funds to strengthening early education. Many states and districts are expanding preschool opportunities for four-year-olds and implementing extended day kindergartens. Federal funding for Head Start preschool programs is increasing dramatically. Many districts have implemented IBM's Writing to Read program in kindergarten and first grades; the State of Mississippi mandated this program statewide. Tennessee, Indiana, Nevada, and districts in other states have implemented substantial reductions in class size in the early grades. Reading Recovery, a first grade tutoring program, is now widely used in Ohio and is expanding rapidly across the country.

All of these interventions, plus others that are less widely used or less publicized, begin with the same rationale: start students off with success, and they will build on this success throughout their school careers. Much of the interest in early intervention focuses on disadvantaged students, who are felt to be more likely to start falling behind in basic skills in the early grades and then never catch up.

The many changes now occurring in early schooling are taking place against a backdrop of growing concern about the effectiveness of American schools, particularly for the children of the poor. This concern is certainly warranted. The National Assessment of Educational Progress (Mullis & Jenkins, 1990) has found steadily increasing reading scores for African American and Hispanic students, but these students still fall far behind Anglo students. On the 1988 assessment, 62% of all nine-year-olds could read at what is called the "basic" level, but only 39% of African American nine-year-olds could do so. In our own research on our Success for All program (Madden et al., 1991), we found that in inner-city Baltimore the lowest quarter of students could hardly read at all at the end of first grade. For example, these students were unable to read and comprehend the following simple passage from the Durrell Silent Reading scale (Durrell & Catterson, 1980):

One outcome of widespread reading failure is a high rate of retentions in urban districts. In many, 20% or more of all first graders repeat first grade, and more than half of all students have repeated at least one grade by the time they leave elementary school. In the early grades, performing below grade level expectations in reading is the primary reason for retention in grade.

Failing to learn to read in the early grades has severe consequences. Longitudinal studies find that disadvantaged third graders who have failed one or more grades and are reading below grade level are extremely unlikely to complete high school (Lloyd, 1978; Kelly, Veldman, & McGuire, 1964). Remedial programs, such as Chapter 1, have few if any effects on students above the third grade level (see Kennedy, Birman, & Demaline, 1986). Many children are referred to special education programs largely on the basis of reading failure, and then remain in special education for many years, often for their entire school careers.

Almost all children, regardless of social class or other factors, enter first grade full of enthusiasm, motivation, and self-confidence, fully expecting to succeed in school (see, for example, Entwistle & Hayduk, 1981). By the end of first grade, many of these students have already discovered that their initial high expectations are not coming true, and have begun to see school as punishing and demeaning. Trying to remediate reading failure later on is very difficult -- by then, students who have failed are likely to be unmotivated, to have poor self-concepts as learners, to be anxious about reading, and to even hate reading. Reform is needed at all levels of education, but no goal of reform is as important as seeing that all children start off their school careers with success, confidence, and a firm foundation in reading. Success in the early grades does not guarantee success throughout the school years and beyond, but failure in the early grades does virtually guarantee failure in later schooling. This is one problem that must be solved.

If there is a chance to prevent the negative spiral that begins with early reading failure, then it seems necessary to do so. Even very expensive early interventions can be justified on cost-effectiveness grounds alone if they reduce the need for later and continuing remedial and special education services, retentions, and other costs (Barnett & Escobar, 1987). Although the cost-effectiveness estimates associated with the Perry Preschool Model (Berrueta-Clements et al., 1984) have been criticized as unrealistic by many researchers (see Holden, 1990), they have contributed to a widespread acceptance of the idea that early intervention, even if expensive, ultimately pays back its costs.

Forms of Early Intervention

Given agreement on the proposition that investments in early intervention are worthwhile, the next question is: which forms of early intervention are likely to have the greatest impact? This report explores the impacts of the most widely discussed, widely implemented, or plausible early intervention programs on success in early schooling, particularly in reading.

We focus on early reading for several reasons. First, students who fail to learn to read in the first grade are seriously at risk. Whatever other impacts an early intervention may have, if a child fails to learn to read, he or she is in deep trouble. Second, reading performance can be readily measured in the early grades using individually administered measures (although there is serious debate about the meaning of standardized reading tests for young children). Third, perhaps most importantly, success in first grade is essentially synonymous with success in reading. Few first graders who are reading adequately are retained or assigned to special education.

We review nine principal types of early schooling programs in this report.

1. Substantial reductions in class size in the early grades.
2. Provision of instructional aides in the early grades.
3. Preschool for four-year olds.
4. Extended-day kindergarten.
5. Retaining students in kindergarten and first grade.
6. Provision of transitional first grade, developmental kindergarten, and other extra-year programs for immature or at-risk children.
7. IBM's Writing to Read computer-assisted instruction program for kindergarten and first grade.
8. One-to-one tutoring in reading for at-risk first graders by certified teachers or paraprofessionals.
9. Success for All, a comprehensive program which combines preschool, curriculum reform, tutoring, and other elements.

One important feature in common to these programs is that all are expensive, and most are of similar orders of magnitude of cost. For example, reducing class size by half (e.g., from 30 to 15) involves hiring an additional certified teacher for each class. This same teacher could teach a preschool class, could be added to the kindergarten staff to enable a school to have full-day kindergarten, or could tutor about fifteen low-achieving first graders twenty minutes per day. Retention or provision of extra-year programs for kindergartners or first graders adds one year's per-pupil cost per child -- about $4,000 -- for each child who is retained or who receives the extra year program. The costs of Writing to Read and other integrated CAI programs require at least one additional aide per school plus initial and continuing costs roughly comparable to the cost of additional certified teachers. The least expensive programs are provision of instructional aides to kindergarten or first grade and traditional Title I/Chapter 1 programs, which are still expensive by general standards of instructional innovations.

However, "expensive" is a relative term. In many disadvantaged school districts, the cost of many of these programs could be easily met if the district's per/pupil expenditure were simply at instead of far below the state average.

This report is not an exhaustive and complete review of research on the potential of alternative early intervention programs to prevent school failure. Rather, it describes "order of magnitude" estimates of program effects, and discusses the policy implications of different approaches. For most of the nine program types, complete quantitative reviews of the literature exist, and we rely on these estimates of program effects (also see Slavin, Karweit, Wasik, & Madden, in press).

The major outcome of interest in this review is reading as of the end of first grade. We also report program effects as of the end of grades 2 and 3, when possible, either as followup assessments of early intervention programs or as continuing assessments of early intervention programs that extend through grade 3. Also, we emphasize individually administered reading measures. The inadequacies of group-administered standardized tests are well known and have been compounded in recent years as first grade tests have become particularly susceptible to "teaching-to-the-test" effects (see Koretz et al., 1991). However, when group-administered standardized tests are the only measures available, we do report effects on these measures (with appropriate qualifications).

In most cases, effects of various programs on first grade reading achievement are characterized as effect sizes. These are computed as the difference in performance between students who received a given program and those who did not, divided by the comparison group's standard deviation. If effect sizes cannot be computed, then program effects are simply characterized as significantly positive or negative, or as not significantly different from the comparison group.

In addition to reading, we emphasize retention rates and rates of placement in special education. These are particularly important in describing the long-term impacts of early intervention. When possible, we estimate the effects of various programs for disadvantaged or at-risk students. This is not as easy as it seems. Some programs (such as reducing class size or IBM's Writing to Read program) are intended to serve all students in a given grade level, while others (e.g., one-to-one tutoring) are targeted on specific students known to be struggling with reading. Successful programs for low achievers could have benefits for students who do not receive the services themselves by reducing the heterogeneity of the regular classroom and making the teacher's job easier, but such spin-off effects are never measured. In our discussions of the various programs, we attempt to clarify the groups of students who are most likely to be affected by each.

Class Size

Effects of substantial reductions in class size should perhaps be the standard against which all expensive early interventions are judged. Reducing class size is perhaps the most direct translation of money into change at the school site. It is politically popular, easy to mandate at the legislative level, and clearly raises morale among teachers. But does it increase student achievement?

Reviews of research on the achievement effects of substantial reductions in class size have generally concluded that if there is an achievement effect, it is mostly (or perhaps only) seen in the early grades (e.g., Robinson & Wittebols, 1986; Slavin, 1989). However, even at the lowest grade levels, the effects tend to be small (see Slavin, in press). Two statewide experiments in South Carolina involving class size reductions from 29 to 21 found tiny positive effects (Johnson & Roan-Quintana, 1978), as did a statewide study of Indiana's Prime Time program, which reduced class size from 23.5 to 18 (Farr, 1987). A large study in New York City compared first graders in 99 schools with class sizes of 16 to similar students in 22 schools with class sizes of 26 (Jarvis et al., 1987). The difference on standardized reading tests was a trivial +.09. Mazareas (1981) compared first graders in class sizes of 30 and 20 in a Massachusetts city and actually found slightly higher achievement in the larger classes (ES = -.12).

The most important studies of class size are evaluations of Tennessee's STAR program. A pilot study followed students in class sizes of 25 and 15 from first to third grade. Significant differences favoring the smaller classes were seen in first grade, but disappeared in the second and third grades (Bain et al., 1988). A much larger study made a similar comparison, following more than 6,500 students randomly assigned to small (15) classes, large (25) classes, or large classes with aides, from kindergarten to third grade. By the end of first grade, reading effects favored the smaller classes with an effect size of + .34 (Word et al., 1990). By the end of third grade (after four years of smaller classes), effect sizes for reading were +.24, a positive but small effect.

Finn (1990) suggested that larger effects may be seen with minority students than with white stu-

dents, but many other studies that also primarily involved minority students low in socioeconomic status did not find educationally significant effects of reducing class size.

In sum, substantial reductions in class size appear to bring about small to moderate increases in reading achievement in the first grade, but the effect does not accumulate with additional years of small classes.

Aides

The use of teacher aides can reduce pupil-to-adult ratios at half the cost of additional teachers. Use of paraprofessionals is particularly common in the preschool, kindergarten, and early elementary grades. But research on the achievement effects of adding paraprofessionals to elementary classes has generally found few if any effects on achievement. A comprehensive review by Schuetz (1980) located a few studies in which positive effects were found, but the great majority of studies found no positive effects.

The two largest studies of class size in the early grades also included assessment of effects of paraprofessionals on students' achievement. Jarvis et al. (1987) compared 103 New York City first grade classes with paraprofessionals to 74 matched classes of similar size without aides. Small, non-significant positive effects were found for the classes which had paraprofessionals.

In the large Tennessee class size study, some students were randomly assigned to classes with aides and others to similar-sized classes without them. As in the New York City study, very small positive effects on reading were found for aides (ES = +.15) at the end of first grade. By the end of third grade, the difference between students who had instructional aides for four years and those who had been in regular-sized classes without aides for four years was negligible (ES = +.05) (Folger & Breda, 1990). One likely reason was indicated by a questionnaire on which the aides reported spending an average of less than 25% of their time actually working with students. The rest of their time was spent on clerical activities and on such custodial activities as supervising lunch or recess.

Other assessments of what aides do have found similar patterns (see Schuetz, 1980). In essence, aides primarily make teachers' jobs easier rather than serving an essential instructional function. This may be important, but it implies that the effects of providing paraprofessionals should be sought in teacher morale and teacher retention rather than on student reading outcomes.

Studies of the use of aides have focused on how they are typically used, not on how they could be used to greater effect. As described later, structured one-to-one tutoring programs delivered by paraprofessionals have been effective in accelerating student reading achievement.

Preschool

Perhaps the most talked-about of all early childhood programs in recent years has been the provision of preschool experiences to four-year-olds. The idea that developmentally appropriate preschool programs emphasizing language development, self-esteem, and school readiness could prevent learning failures among lower-class children was popular in the 1960's and early 1970's (see Stanley, 1972), and led to the establishment of the federal Head Start program as part of President Johnson's War on Poverty. Evidence from longitudinal studies that effects of preschool fade in the early elementary grades (e.g., Lazar & Darlington, 1982; McKey et al., 1985) dampened some of the enthusiasm for preschool, but the favorable political status of preschool was re established by evidence which suggested that adolescents who had attended preschool were less likely than similar agemates to drop out of school or to become delinquent (Berrueta-Clement et al., 1984).

Research on preschool presents an interesting puzzle. The immediate positive effects of preschool on measures of language and IQ are clear, yet it is equally clear that these effects are not sustained in the early elementary grades (Karweit, 1989a; McKey et al., 1985). After their initial boost, effects of preschool on IQ and other measures diminish until they are not detectable by the end of first or second grade. Further, little evidence exists that preschool experience directly increases reading achievement in the early elementary grades (Karweit, in press a). Preschool attendance does appear to significantly reduce special education placements and retentions in the elementary grades (Schweinhart & Weikart, 1985; Gray, Ramsey, & Klaus, 1982). These effects may explain the long-term effects on dropout; in particular, retention in the early grades is a major predictor of dropout (Lloyd, 1978).

The effects of preschool on reducing retentions, special education placements, and ultimate dropout recommends the inclusion of preschool

in any comprehensive approach to prevention and early intervention. However, preschool by itself is not an adequate response to the needs of at-risk children, as students who have had preschool seem to be as likely as other students to fail to learn to read in the early grades. Sustained intervention in the early elementary grades may be needed to maintain students' early gains.

Extended-Day Kindergarten

Kindergarten is attended by most youngsters in the U. S. today. Most common is a half-day morning or afternoon program. However, school districts are increasingly moving toward full-day kindergarten programs, and federal Chapter 1 funds are often used to extend the kindergarten day. Because full-day kindergarten costs roughly twice as much as half-day, it it important to know whether this investment pays off.

Many studies compare full- and half-day kindergarten. A review by Karweit (1987) concluded that effects of full-day kindergarten on end-of-kindergarten measures are positive for disadvantaged students, but these gains are not maintained. Well-designed longitudinal studies by Johnson (1974) and Winter & Klein (1970) found that initial positive effects of full-day kindergarten disappeared by the end of first grade. Both of these studies used random assignment of students to full- and half-day programs. However, both studies had small samples, so a true effect may have been missed. Effect sizes at the end of kindergarten vary widely, but are mostly in the moderate range for pre-reading measures (+.30 to +.50). One study found that students in full-day kindergartens were less likely to be retained in first grade than those who had been in half-day programs. (Horst & Donahue, 1991).

Retention

Retention in kindergarten or first grade is one of the most common strategies for attempting to prevent early reading failure. In particular, first grade retention rates in recent years in large urban school districts have often exceeded 20%. The movement toward higher standards in the late 1970's often entailed a reaction against "social promotion" and establishment of strict grade-to-grade promotion standards (see, for example, Owen & Ranick, 1977; Elligett & Tocco, 1983). Given a common belief that if retention is necessary it should be done as early as possible (Overman, 1986), it is not surprising that first grade has one of the highest retention rates.

Interpreting research on retention is difficult. One problem revolves around the difficulty of defining a comparison group for retained children (see Karweit, in press b). Should the child be compared to non-retained students of the same age, or to students promoted from the previous grade who are now the retained child's classmates? Should a student who repeats first grade be compared at the end of the year to second graders (his agemates) or to first graders (his grademates)?

Another problem in studies of retention is that most use some form of matching between retained and non-retained students. For example, retained students might be compared to non-retained agemates of the same IQ. The problem is that IQ or other matching criteria can never capture all of the factors that lead a child to be retained. If two children have IQ's of 80 and one is retained while the other is promoted, the students are probably quite different in motivation, actual school performance, behavior, and other factors not picked up by an IQ score. Only three very old studies randomly assigned low-achieving students to be promoted or retained, and they found equivocal results (see Jackson, 1975). None of these studies included kindergartners or first graders.

The general pattern in matched studies of retention is that in comparison to their (younger) grademates, retained students show an improvement in relative scores the year after being retained, but this advantage disappears in later grades. In comparison to agemates, retained students generally do about the same as matched controls in the year they repeat a grade, and then fall farther behind in later years (Shepard & Smith, 1989; Karweit, in press b). The methodological problems in these studies make it difficult to say whether retention is actually harmful to students or whether it has no effect, but there is no evidence of any long-term benefit. The conclusion of a 1975 review by Jackson (1975, p. 627) still holds today: "Those educators who retain pupils in a grade do so without valid research evidence to indicate that such treatment will provide greater benefits to students with academic or adjustment difficulties than will promotion to the next grade."

The short-term boost in test scores relative to their new grademates experienced by retained students can have important policy consequences. Because test scores used for accountability pur-

poses are almost invariably reported by grade level, not age, retaining large numbers of students appears to increase a school's test scores, particularly when test scores are reported in terms of percentiles. Retained students appear to score better (in the short run) because they are being compared to norms for which they are at least a year too old. This retention "bonus" is particularly large in first grade; a study by Elliget and Tocco (1983) found that retained first graders appeared to "gain" 39 percentile points, or 20 normal curve equivalents (NCE's) in reading comprehension. In contrast, Chapter 1 students in general gain an average of 3.0 NCE's in reading. This phenomenon often makes it appear that a policy of high retentions is working, especially in Chapter 1 evaluations that focus on the lowest-achieving students, who are most likely to be retained (see Slavin & Madden, in press).

Developmental Kindergarten and Transitional First Grade

In an attempt to help students felt to be at risk start school with a better chance of success, many schools insert an additional year of instruction between the first day of kindergarten and the last day of first grade. This strategy takes two major forms. Developmental kindergarten is a term often used to describe special two-year kindergarten programs which enroll students felt to be at risk when they enter kindergarten. In contrast, transitional first grades or pre-first programs identify at-risk students at the end of kindergarten and give them a special year of instruction designed to help them succeed in regular first grade. Developmental kindergarten and transitional first grade resemble early retentions in that the student is a year older than his or her grademates at the end of the process, but differ from retentions in that they provide specially designed instruction, usually in small classes, to try to accelerate at-risk students into the mainstream.

Research on these extra-year programs (see Karweit, in press b) shares the methodological problems of research on retention, and few studies have even compared matched students in alternative treatments. Banerji (1990) found that students in a two-year developmental kindergarten had higher scores at the end of first grade than matched grademates or agemates, but the effects faded in second and third grades. Raygor (1972) randomly assigned at-risk students to be retained in kindergarten or to go to a structured transition class. Outcomes at the end of first grade favored the transition class students, but there were no differences by third grade. Zinski (1983) compared students who attended transitional first grade with matched students who repeated first grade, and found nonsignificant effects favoring the retained students.

In sum, evidence on the effects of extra-year programs is scanty and flawed, but that which exists provides little indication that such programs have lasting effects compared to promotion.

Writing to Read

IBM's Writing to Read program is designed to improve the reading and writing achievement of students in kindergarten and first grade. The program uses computers to help students learn phonics skills, uses either computers or electric typewriters to help teach writing, and includes other activities which do not use technology (see Martin & Friedberg, 1986).

Writing to Read has been widely adopted, particularly in school districts that serve large numbers of disadvantaged students. The State of Mississippi, which has the highest number of children in poverty, the lowest per capita income, and the second lowest per-pupil expenditure in the U. S., recently mandated Writing to Read in all elementary schools. The program is used in Washington, D.C., Atlanta, Baltimore, Tulsa, Dallas, Fort Worth, and many other major cities.

Despite the popularity of the program, research on Writing to Read does not unambiguously support its effectiveness (Freyd & Lytle, 1990; Krendl & Williams, 1990; Slavin, 1990, 1991). Students in Writing to Read are routinely found to perform better than those in control classes on writing measures (see Murphy & Appel, 1984), but this has little meaning because writing has rarely been taught at all in control groups. Small effects on reading performance are typically seen in kindergarten studies; Slavin (1991) estimates an effect size of +.23 across 21 studies. However, there is evidence that positive effects of Writing to Read in kindergarten were found in many cases because the traditional kindergartens used as control groups were not teaching reading. One indirect indication of this is that across 13 studies, the median effect size for first grade implementations of Writing to Read is .00 (Slavin, 1991).

Two-year implementations of the program in kindergarten and first grade have also found no positive effects (Sierra & Naron, 1988; Levinson & Lalor, 1989), and followup studies of first

grade implementations have found few differences in second grade achievement (e.g., Metropolitan Public Schools, 1987; Staff, 1987). Because the costs of Writing to Read can approach those of reducing class size, tutoring or other expensive early interventions, there is little to recommend this program as a means of preventing early reading failure.

One-to-One Tutoring

A strategy that has long been used with at-risk students and which is becoming increasing popular is to give students who are experiencing reading problems one-to-one instruction from a specially trained tutor. Tutoring of this type is usually focused on first graders, on the principle that intensive help is both more needed and more likely to be successful when students are first learning to read.

Although one-to-one tutoring for at-risk students is a common intervention, studies of tutoring have focused on a set of specific tutoring models, each of which incorporates curricula, teaching methods, and training procedures. Some of these models use certified teachers, while others use paraprofessionals.

The most extensively researched and widely used of the structured tutoring models is Reading Recovery, a program originally developed in New Zealand by Marie Clay (1985) and then further developed, researched, and disseminated by a group of researchers at Ohio State University. In Reading Recovery, tutors are certified teachers who work one-on-one with at-risk first graders until they meet a discontinuation criterion of reading performance.

The training for Reading Recovery takes a year, alternating between instruction and practice. The Reading Recovery instructional approach emphasizes use of progressively more difficult children's books, teaching word attack skills only in the context of students' reading, teaching of such metacognitive strategies as use of context and matching spoken with written words, and integrating writing and reading (see Pinnell, DeFord, and Lyons, 1988).

In two longitudinal studies of Reading Recovery conducted in Ohio, students were randomly assigned to Reading Recovery or to traditional Chapter 1 programs. Both studies found substantial positive effects of the program on reading achievement at the end of first grade. Effect sizes were +.72 and +.78, respectively. While the absolute magnitude of the achievement differences remained the same at the end of the second and third grades, the increasing standard deviation meant that effect sizes diminished to +.14 by the end of third grade in one study (Pinnell, 1988) and +.25 in the second (DeFord, Pinnell, Lyons & Young, 1988). Differences in retention rates between Reading Recovery and control students were small and non-significant by third grade. A later Chicago study found end-of-first-grade effects similar to those of the earlier studies (Pinnell, DeFord, and Lyons, 1991), as did an Ohio statewide study (Seltzer, Bryk, & Shen, 1990).

The Prevention of Learning Disabilities tutoring model, like Reading Recovery, uses certified teachers to work one-on-one with at-risk first graders, but it differs in most other ways. The model identifies children who have perceptual or neurological indicators of learning disabilities and then provides them with tutoring keyed to their specific deficits. Students receive tutoring 3-5 times per week for as much as two years.

A study of Prevention of Learning Disabilities by Silver, Hagin, and Beecher (1981) in which students were randomly assigned to treatment or control groups found strong positive effects as of the end of second grade (ES = +1.09) which were maintained a year later (ES = +1.20). Another study by Arnold et al. (1977) found similar end-of-second-grade effects (ES = +1.09), but a third study (Mantzicopoulos et al., 1990) found small and nonsignificant differences (ES = +.21).

Other one-to-one tutoring programs have used paraprofessionals to tutor at-risk first graders. A structured program focusing on phoneme identification skills was found to improve student reading skills at the end of first grade (Wallach & Wallach, 1976). Programmed Tutorial Reading, a program based on principles of programmed instruction, was also found to increase end-of-first grade reading performance (Ellison et al., 1968).

All forms of tutoring were more effective than any other first-grade reading strategy. However, those using certified teachers were generally more effective than those using aides. Across all measures and studies, the median effect size at the end of first grade for Reading Recovery was +.75 and for Prevention of Learning Disabilities was +1.01. Success for All, which uses one-to-one tutoring by certified teachers as part of a compre-

hensive approach, obtained a median effect size of +1.28 for at-risk first graders (see below). Effect sizes for the Wallach and Wallach program averaged +.70, and for Programmed Tutorial Reading, +.40 (see Wasik & Slavin, 1990). These effect sizes are all considerably larger than those for any other intervention; recall that the largest effect size for any study of halving class size was +.34, and most studies found much smaller sizes. The three programs which use certified teachers as tutors -- Reading Recovery, Prevention of Learning Disabilities, and Success for All -- also have evidence that initial gains are maintained.

Success for All

The Success for All program (Madden et al., 1991) is designed to provide whatever is necessary to see that all students (usually in schools serving very disadvantaged populations) reach the third grade on time, performing adequately in basic skills. The program includes many components. Research-based curricula are introduced in preschool, kindergarten, and beginning and intermediate reading, writing/language arts, and mathematics.

Beginning in first grade, students who are most at risk receive one-to-one tutoring in reading from trained certified teachers. This tutoring is closely coordinated with the beginning reading instruction provided in the regular reading class. Students are assessed in reading every eight weeks, at which time some students exit from tutoring so that students with greater deficits can be served. The typical student who receives any tutoring will receive about a semester of tutoring service, but in principle a student could receive up to three years of daily one-to-one tutoring. In addition to its instructional elements, Success for All also provides family support services focusing on building positive parent-school relationships and on solving any non-academic problems that interfere with student success in school, such as truancy, behavior problems, or health, vision, or hearing problems. A family support team may provide direct services to children and families or coordinate the services of other providers.

A project facilitator works in each school to coordinate the many program elements and to carry on continuing staff development. The facilitator manages the eight-week assessments, visits teachers and gives them feedback on their implementation, organizes meetings among school staff to discuss effective strategies and to coordinate services, and tries to make sure that no child is forgotten or "falls between the cracks."

Effect sizes for the students in the lowest 25% of their classes at pretest averaged +1.28 for students in schools with adequate tutoring resources (see Wasik & Slavin, 1990). By third grade, the Success for All low achievers still far out-performed matched control students (ES = +1.07). Effects were also very positive for students in general, averaging +.55 at the end of first grade and +.46 at the end of third grade (Madden et al., 1991). In addition, the program reduced retentions from 11% to near zero and cut special education placements in half in fully-funded sites.

Conclusion

Among the nine strategies reviewed in this report, the most effective by far for preventing early school failure are programs that involve one-to-one tutoring in reading for first graders, especially in structured models that use well-trained certified teachers as tutors. Such programs not only have the largest immediate effects on reading achievement, but they are also the only programs known to have lasting effects, at least through the third grade. Preschool experience has rarely been found to affect reading success, but its long-term impact on retentions and special education placements indicates that it should be part of a preventive strategy. Success for All, which incorporates tutoring and preschool as well as other elements, is the only strategy that has long-term evidence of effectiveness in terms of reading, retention, and special education placement.

Other interventions have positive effects that are either smaller or more short-lived. Substantial reductions in class size can apparently increase reading achievement, but not by much. Extended-day kindergarten programs have impacts on pre-reading measures at the end of kindergarten but not on actual end-of-first-grade reading measures. On the other hand, use of instructional aides, the IBM Writing to Read program, retention in grade, and extra-year programs in kindergarten and first grade appear to have few effects on students in the short or long term in

comparison to students of the same age in traditional programs.

The evidence presented here dispels the idea that any one year of early intervention will have substantial lasting impacts on reading achievement. There is no "magic bullet" that sets students on the road to success. Effects of every one-year intervention faded in later years. The two programs which found the largest continuing reading effects through the third grade were Prevention of Learning Disabilities and Success for All. Prevention of Learning Disabilities provides at-risk students with two years of one-to-one tutoring. Success for All provides tutoring that ends in first grade for most at-risk students, but the program emphasizes improved curriculum and instruction, family support, and additional help as needed through the fifth grade.

Maintaining reading success after it is established in first grade is easier, cheaper, and more effective than trying to remediate deficits, but some program of maintenance is necessary if at-risk students are to continue to grow in reading skills beyond first grade, to be promoted each year, and to stay out of special education. Intensive early intervention must be followed by extensive changes in basic classroom instructional practices if all students are to succeed throughout their elementary years.

Perhaps the most powerful comprehensive approach to preventing early reading failure is to combine the strengths of the most effective individual approaches: tutoring, preschool, extended-day kindergarten, and reduced class size in first grade. These (along with other elements) are part of the Success for All program, which seeks to provide the most appropriate instruction for children at each grade level, preschool to five, rather than to hope that any one intervention will be enough.

There is much good news in research on early intervention. The best news is that early school failure is fundamentally preventable. For example, in the first Success for All school in inner-city Baltimore, not a single third grader tested two years behind grade level in reading, a usual criterion for learning disabilities. Ten percent of matched control students tested this poorly. No third grader in the program for three years had been retained; more than a quarter of control third graders had been retained.

Evidence from studies of Reading Recovery and Prevention of Learning Disabilities similarly supports the idea that reading failure can be prevented. Evidence from longitudinal studies of preschool as well as of Success for All suggest that retentions and special education placement can be significantly reduced by early intervention. The importance of knowing that school failure can be prevented is enormous. If we know failure can be prevented, this contributes to a moral and political resolution that it must be prevented.

Another piece of good news is the very fact that educators and legislators at all levels are increasingly willing to make major investments in early education. The class size experiments in Tennessee and Indiana, the widespread use of Writing to Read and Reading Recovery, and the rapid expansion of preschool and extended-day kindergarten show that we are a caring and far-sighted nation. The research reported in this brief review was possible because courageous leaders believed in the power of early intervention and provided the necessary resources. In the next stages of reform we must hold on to the commitment to early intervention as we move toward broader use of more effective strategies and continue to develop and evaluate additional means of ensuring the success of all children.

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